Intermountain/Foothill Grassland Ecotype

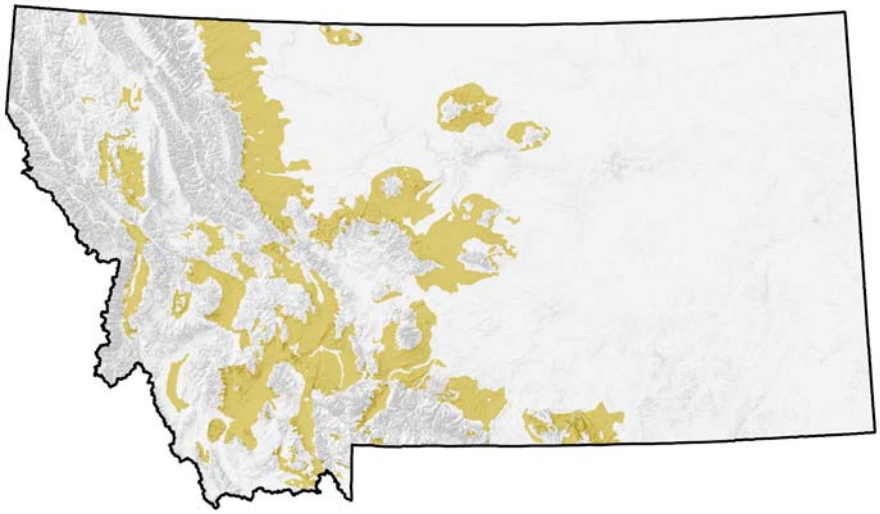

Figure 2. Intermountain/Foothill Grassland Ecotype

The intermountain/foothill grassland ecotype is a mosaic of private and public land that extends from the glaciated Flathead River Valley to the north, south to the Centennial Valley, and east to the Little Belt Foothils, where there remains some of Montana's most diverse fish and wildlife habitats. This western Montana ecotype harbors more wildlife communities than any other in Montana. It also harbors Montana's greatest concentration of human population in and near the towns of Kalispell, Missoula, Helena, and Bozeman. The attraction for wildlife and people is western Montana's broad, lush, and sweeping valleys cradled by the peaks of the Rocky Mountains. The intermountain/foothill grasslands are cut and formed by meandering rivers that create core riparian zones and wetland areas that often include glacial lakes and potholes that attract nesting waterbirds. Addressing the challenges that accompany the interface between human settlement and fish and wildlife and their habitats will be critical to the conservation of these areas.

Landscape Characteristics

The intermountain/foothill grassland ecotype includes 13,414,271 acres and represents 14.3 percent of Montana's land area. The intermountain/foothill grassland ecotype generally lies on level to moderate topography at valley bottoms or lower slopes of mountains, with the Flathead, Clark Fork, Bitterroot, Missouri, Big Hole, Beaverhead, Jefferson, Gallatin, Madison, Yellowstone, and Blackfoot rivers cutting through the ecotype. Elevations are lowest in some of the northwestern valley locations, in some cases below 3,000 feet. Elevations between 3,000 and 4,000 feet occur broadly in the Flathead/Mission and Tobacco valleys. The upper Townsend, Gallatin, and Blackfoot valleys, as well as much of the foothill region to the east of the mountains, are mostly between

4,000 and 5,000 feet. The Jefferson, Madison, Shields/Smith, Paradise, and Deerlodge valleys range from 4,500 to 5,500 feet. Due to glaciation, the northern part of the Flathead Basin contains hundreds of potholes, many of which retain water throughout the average summer.

Soils

Floors of the intermountain valleys of southwestern Montana are mostly composed of thousands of feet of tertiary valley fill deposited at the end of the first stage of mountain building. During the ice ages, the cordilleran ice sheet covered the northern part of the Flathead Basin at various times. Glacial Lake Missoula, formed from meltwater from this ice sheet, reached south into the Bitterroot Valley and west into what is now Washington. Sediments from this lake, plus outwash materials from the ice sheet, cover most of the valley bottoms of the southern part of the Flathead Basin (i.e., south Mission Valley and Hot Springs Valley). Lake sediments farther south (Missoula and Bitterroot valleys) apparently have been eroded away, exposing tertiary fill. The northern parts of the Flathead Basin as well as the Tobacco Valley are underlain by glacial till.

In some places the foothill areas are underlain by outwash from the adjacent mountains; however, more commonly the substrate is some form of sedimentary bedrock. The foothills along the eastern front (Bowman's Corner to the Canadian border), the area north and east of Livingston, and some of the area surrounding the Bears Paw and Little Rocky mountains is underlain by moderately hard sandstones and soft shales of the Cretaceous (beginning about 100 million years ago) Eagle to Willow Creek formations. Part of the foothill areas of these mountains also is composed of Cretaceous soft black marine shales (Colorado Group, Montana Group, Pierre Shale), Cretaceous soft sandstones, siltstones, and claystones (Fox Hills Sandstone, Kootenai Formation). Some of these sedimentary strata may be gently to steeply uplifted as a result of nearby mountain building.

Most of the soils in this ecotype (82 percent, 20,500 mi^2) are described as well developed with dark topsoil horizons, clay "B" horizons, having a cool temperature regime, and occurring under semiarid to subhumid moisture conditions.

Climate

The climate of the intermountain/foothills grassland ecotype varies considerably from one end to the other; generally there is more resemblance to the climate of the plains grassland than to the adjacent mountains. The northwestern valleys are influenced more by Pacific storms in winter and have a more maritime climate than the more southerly valleys. Temperatures there tend to be milder during the winter, and there is a greater proportion of precipitation received

during the winter. Arctic climate outbreaks affect the entire ecotype, although to a lesser extent in the northern foothills.

Annual temperatures average 44 degrees F throughout much of the Gallatin, Townsend, Helena, northern Jefferson, Bitterroot, and Flathead/Mission valleys. In these valleys some areas may have average annual temperatures of 45 degrees F. The Blackfoot, Madison, Paradise, and Jefferson/Beaverhead valleys are about a degree colder because of elevation and/or topography that favor the formation of extreme temperature inversions even in summer. Foothill areas in central and southern Montana experience about the same average annual temperatures as the colder intermountain valleys. The coldest portion of the ecotype is the northern foothills along the eastern front. Some parts of this area sustain average temperatures of 39 to 40 degrees F.

Although maximum daily temperatures in the northwest valleys are similar to those in the Gallatin, Townsend, and Helena valleys, nighttime temperatures average about 5 degrees warmer in the former areas. This generates mean January daily temperatures ranging from 22 to 25 degrees F in the northwest and 20 to 23 degrees in the lower southwest valleys. Temperatures in the colder valleys of the southwest and west central areas range from 19 to 21 degrees F in January. In the foothill locations, January temperatures range from 15 to 22 degrees F.

Mean daily temperatures in July are highest in the Gallatin, Townsend, Helena, northern Jefferson, Bitterroot, and Mission valleys. In the warmest parts of these valleys, daily maximums range from 85 to 86 degrees F. In the Madison, Jefferson/Beaverhead, Paradise, and Flathead valleys and most of the foothill areas, maximum daily temperatures are about a degree lower. The coldest valleys in the extreme southwest and west central areas attain maximums from 80 to 82 degrees F. Highest July nighttime temperatures in the ecotype occur in the Helena and Townsend valleys where they range from 49 to 50 degrees F. The Gallatin Valley is about a degree cooler. A degree cooler than that are the nighttime temperatures in the lower Jefferson, Bitterroot, and Flathead/Mission valleys and most of the foothill region. Nighttime temperatures of 43 to 46 degrees F are experienced in the west-central and extreme southwestern valleys.

The protection afforded the intermountain valleys by the mountains is reflected by the generally much higher annual extreme minimum temperatures contrasted with most of the area to the east. The Mission and Bitterroot valleys are the only parts of Montana with significant areas in plant hardiness zone 5 (mean annual minimums in the minus teens). The remaining area of these valleys, along with the Jefferson/Beaverhead, Gallatin, Madison, Townsend, Helena, Deerlodge, Blackfoot, Missoula, and Tobacco valleys, are in hardiness zone 4B (mean annual minimums in the minus 21 to 25 degrees F range). The central and southern foothill area is mostly in zone 4A (mean annual minimums in the minus

26 to 30 degrees F range). The northern foothill region is partially in zone 3 (mean annual minimums from minus 31 to 40 degrees F range).

The highest annual extreme maximum temperatures occur in the Mission Valley, where much of the area reaches 98 to 99 degrees F on average each year. The Flathead, Missoula, part of the Deerlodge, the lower Jefferson, Gallatin, Townsend, and Helena valleys normally reach 95 to 97 degrees F. This is also the case for the southern and central foothill region.

The longest frost-free season exists in the lower Helena Valley, and acrosshe central and southern foothill sections. Here the season ranges from 120 to 130 days. Lower portions of the Gallatin Valley, the Townsend Valley, and the Flathead/Mission Valley have frost-free seasons ranging from 100 to 125 days. Seasons in the Jefferson, Madison, Paradise, Bitterroot, and Missoula valleys last from 90 to 110 days. Other valleys and the northern foothill areas have seasons ranging from 70 to 100 days.

The intermountain valleys and foothills are basically semiarid, but considerably wetter than the plains grasslands. Mean annual precipitation overall is 15.4 inches. The foothill portion of the ecotype generally is wetter than the intermountain valley portion. Much larger expanses of area receiving more than 16 inches annually occur in the former than the latter area. Broad areas receiving between 10 and 12 inches are found in the Jefferson/Beaverhead Valley, while parts of the Jefferson/Beaverhead/Centennial and Helena valleys get less than 10 inches annually. The Blackfoot Valley and eastern portions of the Flathead/Mission Valley receive between 12 and 16 inches, while western parts of the Flathead/Mission Valley tend to be drier.

Reflecting the stronger maritime influence in the northwest, those valleys tend to receive a smaller proportion of their precipitation in the growing season than do the southwestern valleys and most of the foothill regions. The percentage of moisture falling in the growing season for the Flathead/Mission, Missoula, and Bitterroot valleys ranges from 37 to 45 percent, with a portion of the Mission Valley slightly higher than that. The extreme southwestern valleys (Jefferson/Beaverhead, Madison) and the northern and central foothill region collect 52 to 60 percent of the water during the growing season. Most other areas are in the range of 45 to 55 percent.

Anthropogenic Uses

The intermountain/foothill grassland ecotype is diverse both in land management and its uses by humans. Primary recreational activities include hiking, mountaineering, hunting, biking, snowmobiling, wildlife watching, and skiing. The primary industries in this ecotype are building/construction, farming, ranching, mining, and tourism. The breakdown of landowner stewardship for the intermountain/foothill grassland ecotype is as follows:

U.S. Federal Agencies: 1,007,758 acres, or 7.5% of total area, which include:
BLM: 494,520 acres, or 3.8% of total area
USFS: 408,403 acres, or 3.1% of total area
USFWS: 64,556 acres, 0.5% of total area
NPS: 18,286 acres, or 0.1% of total area
State Agencies: 892,545 acres, or 6.8% of total area
Tribal Lands: 1,091,650 acres, or 8.3% of total area
Private: 10,187,909 acres, or 77.2% of total area
City and County: 6,487 acres, or less than 0.1% of total area

Vegetation

Plant community composition is influenced primarily by the total annual precipitation, which ranges from 8 to more than 20 inches, yearly precipitation distribution, and soil characteristics. The yearly precipitation distribution and, to a certain extent, the total precipitation are related to general geographic location. Northern valleys and foothills tend to receive more total precipitation than more southern areas, while northwestern valleys have a more maritime (winter/spring wet) precipitation. This has an impact on the distribution of major grass species. Most of the potential natural grassland communities within this ecotype can be perceived as different combinations of six or seven major grass species accompanied by a number of subordinate grass and forb species.

Rough fescue (*Festuca scabrella*) extends southward into Montana from Canada, its center of distribution (Moss and Campbell 1947, Coupland and Brayshaw 1953, Tisdale 1947, Stickney 1960). Rough fescue is most abundant and widespread in northwestern Montana on both sides of the Continental Divide, declining southward and penetrating below the 46th parallel only in the Gravelly and Madison ranges. The easternmost occurrences are near Lewistown at the foot of the Judith Mountains.

Idaho fescue (*Festuca idahoensis*) occurs throughout the intermountain/foothill ecotype wherever moisture conditions are favorable, becoming at least a subordinate species at 15 inches of annual precipitation (Ross and Hunter 1976). As well as being a component of most rough fescue communities, Idaho fescue forms habitat types with bluebunch wheatgrass (*Agropyron spicatum*) in most of the medium elevations of southwestern Montana and with western thickspike wheatgrass (*Agropyron dasystachyum*) in foothill areas just east of the mountains where there is enough moisture (Mueggler et al 1980). Idaho fescue rarely occurs as the sole dominant grass. The two Idaho fescue habitat types usually contain prairie junegrass (*Koeleria cristata*) as a subordinate grass. Forbs commonly associated with Idaho fescue include silky lupine (*Lupinus sericeus*), arrowleaf balsamroot (*Balsamorhiza sagitatta*), sticky geranium (*Geranium viscosissimum*), phlox (*Phlox kelseyi*), blanketflower (*Gaillardia aristata*), and pussytoes (*Antennaria microphylla*).

Bluebunch wheatgrass is the most widely spread major forage grass in Montana, occurring at least as a codominant on some sites statewide. In the intermountain/foothill grassland ecotype it is a dominant grass on all upland sites within the 10- to 14-inch precipitation zone (Ross et al 1976). On finely textured soils bluebunch grass forms plant communities where western wheatgrass and thickspike wheatgrass are codominants. Prairie junegrass is usually present and fairly abundant. Other common species include big sagebrush (*Artemisia tridentata* spp. *wyomingensis*), milkvetches (*Astragalus* spp.), biscuitroot (*Lomatium* spp.), sandberg bluegrass (*Poa sandbergii*), hairy goldenaster (*Chrysopsis villosa*), and green needlegrass (*Stipa viridula*). Sites with medium textured, well-drained, shallow soils support little western wheatgrass compared to the finer textured soils but more species like needle-and-thread (*Stipa comata*), sandberg bluegrass, and sometimes blue grama (*Bouteloua gracilis*) as codominants. Such sites occupy about 9 percent (2,325 miles^2) of the ecotype. These communities may contain a variety of shrub species, but those in which shrubs are dominants are included in the shrub grassland ecotype. On sandy sites, bluebunch wheatgrass is a major vegetation constituent along with needle-and-thread, Indian ricegrass (*Oryzopsis hymenoides*), and sometimes prairie sandreed (*Calamovilfa longifolia*). Other species that may be found are aromatic sumac (*Rhus aromatica*), threadleaf sedge (*Carex filifolia*), and yucca (*Yucca glauca*). Within the 15- to 19-inch precipitation zone, bluebunch wheatgrass shares dominance with rough fescue in the northwestern and Idaho fescue in the southwestern and south-central areas of Montana.

Needle-and-thread grass occurs as a community type in some valleys in Montana's extreme southwest (Mueggler et al 1980). This type is found on well-drained, shallow soils that might be limy. Other species include western and thickspike wheatgrass, prairie junegrass, threadleaf sedge, and fringed sedge (*Carex crinita*).

Other sites within the intermountain/foothill grassland ecotype include saline lowlands that support major grasses such as basin wildrye (*Elymus cinereus*), Nuttall alkaligrass (*Puccinellia nuttalliana*), alkali cordgrass (*Spartina gracilis*), saltgrass (*Distichlis stricata*), alkali bluegrass (*Poa juncifolia*), kelsey phlox (*Phlox kelseyi*), and occasionally greasewood (*Sarcobatus vermiculatus*). Also found are subirrigated areas and wetlands that are often dominated by various species of willow (*Salix* spp.) and a variety of hydromorphic grasses, sedges, and rushes. These might include Canada reedgrass (*Calamagrostis Canadensis*), cattails (*Typha latifolia*), Baltic rush (*Juncus balticus*), and basin wildrye (*Leymus cinereus*).

Terrestrial Conservation Focus Areas in Greatest Need (Tier I)

Bitterroot/Frenchtown Valleys (406,859 acres)

Figure 3. Bitterroot/Frenchtown Valleys Focus Area

The Bitterroot/Frenchtown Valleys area is dominated by views of the jagged peaks of the Bitterroot Range to the west and the lower Sapphire Mountains to the east. The Bitterroot River bisects the valley floor from Idaho north to Missoula. The valleys are arid, flat, or gently rolling landscapes 2 to 15 miles wide. While the valleys support many habitats—from grassland and riparian to forest and sagebrush—most of the area is now in agricultural production. The rolling mountain foothills at the valley edges are important elk, white-tailed deer, and mule deer winter range. In the valley bottoms, the cottonwood riparian habitats are some of the most productive wildlife habitats in the state and are home to a wide variety of birds, mammals, reptiles, and amphibians.

Landscape Characteristics

This subsection contains intermountain valleys that formed in alluvium, outwash, and lacustrine sediments. Elevations range from 3,000 to 4,400 feet. Drainage density is slight. Wetlands occur along both the Clark Fork and Bitterroot rivers. Mean annual precipitation ranges from 11 to 25 inches, with about 40 to 60 percent falling as snow. The soil temperature and moisture regimes are frigid and typically ustic. Primary natural disturbances are flooding and fire, as seen by the dramatic effects of the forest fires in the area in 2000. Another important natural biotic disturbance is beaver activity in riparian and wetland areas. Land use is predominantly extensive urban/suburban development and agricultural activities.

The breakdown for land stewardship in the Bitterroot/Frenchtown Valleys area is as follows:

U.S. Federal Agencies:	42,935 acres, or 10.6% of total area, which include:
USFS:	40,155 acres, or 9.9% of total area
USFWS:	2,780 acres, or 0.7% of total area
State Agencies:	14,147 acres, or 3.5% of total area
Private:	348,727 acres, or 85.7% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Mixed Xeric Forest	III	3.57
Wetland and Riparian	I	3.72
Urban	III	3.73
Douglas Fir	II	4.48
Sagebrush	I	4.57
Agricultural Lands - Dry	III	5.73
Mixed Mesic Forest	II	6.05
Ponderosa Pine	II	6.65
Mixed Mesic Shrubs	II	8.52
Altered Herbaceous	II	10.17
Agricultural Lands - Irrigated	III	11.19
Low/Moderate Cover Grasslands	I	25.11

Note: A total of 93.5% of the Bitterroot/Frenchtown Valleys area is represented; 6.5% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 340 terrestrial vertebrate species that are found within the Bitterroot/Frenchtown Valleys Focus Area. Tier I species are listed below. All associations can be found in Table 9.

Amphibians: Coeur d' Alene Salamander, Western Toad, and Northern Leopard Frog

Birds: Common Loon, Trumpeter Swan, Harlequin Duck, Bald Eagle, Long-billed Curlew, Black Tern, Flammulated Owl, Black-backed Woodpecker, and Olive-sided Flycatcher

Mammals: Townsend's Big-eared Bat, Northern Bog Lemming, Gray Wolf, and Grizzly Bear

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, degradation, and fragmentation, especially as a result of human population growth and development of transportation infrastructure	Support strategic conservation easements by conservation organizations and public agencies
	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote further development of county ordinances that help guide future residential and commercial development
Invasive and exotic plant and animal species	Participate in partnerships to develop and implement weed control strategies as well as invasive species management
Range and forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

Central Montana Broad Valleys (2,604,058 acres)

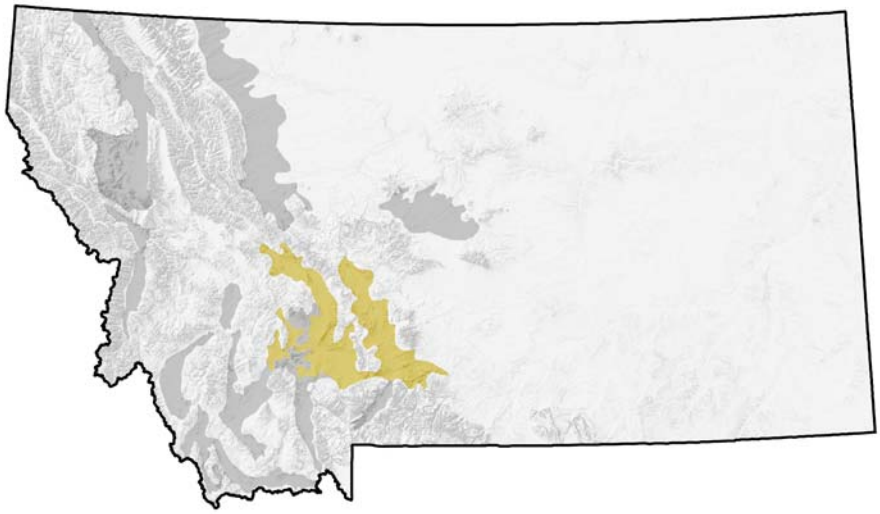

Figure 4. Central Montana Broad Valleys Focus Area

These central valleys include the areas from Three Forks, where the Missouri River begins, north through the Helena Valley, as well as White Sulphur Springs, and south, on the east side of the Belt and Bridger mountains. The valleys are situated among the foothills of the Rocky Mountains where precipitation is reduced by the rain shadow effect. Low and moderate cover grasslands dominate the valley floors, and the dry environment highlights the importance of the riparian areas along the Missouri, Smith, and other rivers and streams. Higher elevations capture enough precipitation to support fir, spruce, and pine forests.

Landscape Characteristics

This subsection has broad intermontane valleys that formed in Tertiary sediments and Quaternary alluvial deposits derived from volcanic rocks, shale, and sandstone. Elevations range from 3,750 to 6,800 feet. Drainage density is low. Mean annual precipitation ranges from 10 to 25 inches, with about 30 percent falling as snow. The soil temperature and moisture regimes are frigid and aridic ustic. The primary natural disturbances are fire and flooding. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly livestock grazing, crop production, and urban/suburban development. The breakdown for land stewardship in the Central Montana Broad Valleys area is as follows:

U.S. Federal Agencies:	101,375 acres, or 3.8% of total area, which include:
BLM:	67,460 acres, or 2.6% of total area
USFS:	21,313 acres, or 0.8% of total area
USFWS:	556 acres, or less than 0.1% of total area

State Agencies: 162,163 acres, or 6.2% of total area
Private: 2,331,192 acres, or 89.5% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Moderate/High Cover Grasslands	I	2.19
Rock	III	3.83
Wetland and Riparian	I	5.24
Sagebrush	I	8.16
Very Low Cover Grasslands	I	8.45
Agricultural Lands - Irrigated	III	9.45
Agricultural Lands - Dry	III	11.08
Low/Moderate Cover Grasslands	I	38.26

Note: A total of 86.65% of the Central Montana Broad Valleys area is represented; 13.35% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 318 terrestrial vertebrate species that are found within the Central Montana Broad Valleys Focus Area. Tier I species are listed below. All associations can be found in Table 10.

Amphibians: Western Toad and Northern Leopard Frog

Birds: Common Loon, Bald Eagle, Greater Sage-Grouse, Mountain Plover, Long-billed Curlew, Black Tern, and Burrowing Owl

Mammals: Townsend's Big-eared Bat, Pallid Bat, Black-tailed Prairie Dog, Grizzly Bear, Canada Lynx, and American Bison

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, degradation, and fragmentation, especially as a result of human population growth	Support strategic conservation easements by conservation organizations and public agencies
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote further development of county ordinances that help guide future residential and commercial development

	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
Invasive and exotic plant species	Participate in partnerships to develop and implement weed control strategies
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

References

The Nature Conservancy. 2000. Middle Rockies-Blue Mountains Ecoregional Conservation Plan. Prepared by the Middle Rockies-Blue Mountains Planning Team. 58 pp + appendices.

Deerlodge Valley (175,260 acres)

Figure 5. Deerlodge Valley Focus Area

One of several broad, intermountain valleys located in southwestern Montana, the north-flowing Clark Fork River bisects the Deerlodge Valley along an east-west axis. Cattle ranching and hay production are the chief agricultural activities. Native bunchgrasses occur on the valley foothills, which provide important elk and deer winter range and support other diverse nongame wildlife.

Landscape Characteristics

This subsection consists of an intermontane valley that formed in Tertiary sedimentary rocks and more recent stream deposits. Elevations range from 4,400 to 6,000 feet. Drainage density is moderate. Mean annual precipitation ranges from 11 to 16 inches, with about 20 percent falling as snow. The soil temperature and moisture regimes are frigid and aridic ustic. The primary natural disturbances are flooding and mass wasting. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly agriculture, livestock grazing, and urban/suburban development. The breakdown for land stewardship in the Deerlodge Valley area is as follows:

U.S. Federal Agencies:	1,792 acres, or 1% of total area, which include:
BLM:	62 acres, or less than 0.1% of total area
NPS:	1,730 acres, or 0.9% of total area
State Agencies:	14,023 acres, or 8% of total area
Private:	159,445 acres, or 91% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Very Low Cover Grasslands	I	2.00
Mixed Barren Sites	III	2.14
Altered Herbaceous	II	3.22
Mixed Xeric Shrubs	I	4.70
Sagebrush	I	4.96
Moderate/High Cover Grasslands	I	5.37
Wetland and Riparian	I	6.14
Agricultural Lands - Irrigated	III	6.99
Mixed Mesic Shrubs	II	7.18
Low/Moderate Cover Grasslands	I	51.73

Note: A total of 94.42% of the Deerlodge Valley area is represented; 5.58% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 259 terrestrial vertebrate species that are found within the Deerlodge Valley Focus Area. Tier I species are listed below. All associations can be found in Table 11.

Amphibians: Western Toad and Northern Leopard Frog

Birds: Common Loon, Trumpeter Swan, Harlequin Duck, Bald Eagle, Long-billed Curlew, and Black Tern

Mammals: Townsend's Big-eared Bat and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, degradation, and fragmentation, especially as a result of human population growth	Support conservation easements by conservation organizations or public agencies
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote further development of county ordinances that help plan for and manage development
Invasive and exotic plant species	Participate in partnerships to develop and implement weed control strategies

Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

References

The Nature Conservancy. 2000. Middle Rockies-Blue Mountains Ecoregional Conservation Plan. Prepared by the Middle Rockies-Blue Mountains Planning Team. 58 pp. + appendices.

Flathead River Valley (1,586,787 acres)

Figure 6. Flathead River Valley Focus Area

The glaciated Flathead Valley of northwestern Montana lies among majestic mountain ranges and cradles the Flathead River. The primary stem of the Flathead River and the Stillwater and Tobacco rivers are among the major headwater rivers of the Columbia basin. The valley supports diverse wetland and aquatic communities including glacial lakes, ponds, spring creeks, riparian swamps, cottonwood forests, oxbow lakes, and Flathead Lake, the nation's largest natural freshwater lake west of the Mississippi. The northern and southern reaches of the valley still support intact palouse prairie habitats interspersed with wetlands and forest.This region historically has provided habitat for nesting, migrating, and wintering waterfowl and a range of habitats for upland game birds, raptors, shorebirds, colonial waterbirds, and other resident and migratory species. In particular, the region was an important historic northern leopard frog habitat and is the focus of northern leopard frog reintroduction efforts. It also contains important seasonal habitat for black bears, grizzly bears, mountain lions, elk, mule deer, and white-tailed deer. The rich resources of the valley floor—riparian/wetlands, grasslands, and foothills—are primarily in private ownership and are under extreme development pressure.

Landscape Characteristics

This subsection consists of an intermontane basin that formed in alluvium, glacial outwash, and lacustrine sediments underlain by argillite, siltite, and dolomite. Elevations range from 2,300 to 6,200 feet. Drainage density is low to moderate. Mean annual precipitation ranges from 14 to 25 inches, with about 50 percent falling as snow. The soil temperature and moisture regimes are frigid and typically xeric. The primary natural disturbances are fire and flooding. Another

important natural biotic disturbance is beaver activity in riparian and wetland areas. Land use is predominantly agriculture and timber harvest on public and to a greater degree private lands, as well as rural/suburban development. The breakdown for land stewardship in the Flathead River Valley area is as follows:

U.S. Federal Agencies:	132,943 acres, or 8.4% of total area, which include:
USFS:	108,047 acres, or 6.8% of total area
USFWS:	24,711 acres, or 1.6% of total area
State Agencies:	98,904 acres, or 6.2% of total area
Tribal Lands:	456,713 acres, or 28.8% of total area
Private:	898,121 acres, or 56.6% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Lodgepole Pine	III	2.54
Wetland and Riparian	I	2.85
Mixed Mesic Shrubs	II	2.85
Ponderosa Pine	II	2.92
Mixed Xeric Forest	III	3.06
Agricultural Lands - Dry	III	3.40
Altered Herbaceous	II	4.22
Sagebrush	I	6.63
Douglas Fir	II	7.26
Water	III	9.29
Agricultural Lands - Irrigated	III	9.88
Low/Moderate Cover Grasslands	I	15.56
Mixed Mesic Forest	II	17.71

Note: A total of 88.16% of the Flathead River Valley area is represented; 11.84% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 344 terrestrial vertebrate species that are found within the Flathead River Valley Focus Area. Tier I species are listed below. All associations can be found in Table 12.

Amphibians: Western Toad and Northern Leopard Frog

Birds: Common Loon, Trumpeter Swan, Bald Eagle, Columbia Sharp-tailed Grouse, Long-billed Curlew, Black Tern, Flammulated Owl, Black-backed Woodpecker, and Olive-sided Flycatcher

Mammals: Townsend's Big-eared Bat, Northern Bog Lemming, Grizzly Bear, Gray Wolf, and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat fragmentation, especially as a result of human population growth/development and expansion of the transportation network	Support conservation easements and other methods that help protect critical habitat on private lands, including corporate forested lands
	Work with Montana Department of Transportation and Federal Highway Commission to effectively mitigate impacts of highway construction
	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote further development of county ordinances that help guide future residential and commercial development
Human/wildlife conflicts and related wildlife mortality	Public education regarding human/wildlife conflicts
	Work with Montana Department of Transportation and Federal Highway Commission to effectively mitigate impacts of highway construction
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles
Water quality degradation	Support watershed, riparian, and grassland restoration opportunities with Confederated Salish and Kootenai Tribes, Montana Department of Environmental Quality, U.S. Natural Resource Conservation, and Partners for Wildlife Program
Invasive or exotic plant species	Support efforts to eradicate exotic or invasive plant species when appropriate

Altered fire regimes	Work with coordinating agencies to mimic natural fire regimes

References

Confederated Salish and Kootenai Tribes and Montana Fish, Wildlife & Parks. 2003. Flathead Subbasin Plan Assessment: Executive Summary. Northwest Power and Conservation Council. Portland, OR.

Kootenai Tribe of Idaho and Montana Fish, Wildlife & Parks. 2004. Public Review Draft Kootenai Subbasin Plan. Executive Summary. Report prepared for the Northwest Power and Conservation Council. Portland, OR.

The Nature Conservancy. 2004. Canadian Rocky Mountains Ecoregional Assessment. Four volumes, including Report, Appendices, Conservation Area Descriptions and Maps.

U.S. Fish and Wildlife Service. 2004. Conservation Focus Areas of the Great Divide: a vast region encompassing the Upper Missouri, Yellowstone and upper Columbia watersheds. Publisher: USFWS, Benton Lake Wildlife Refuge, Great Falls, MT. 77 pp.

Little Belt Foothills (839,541 acres)

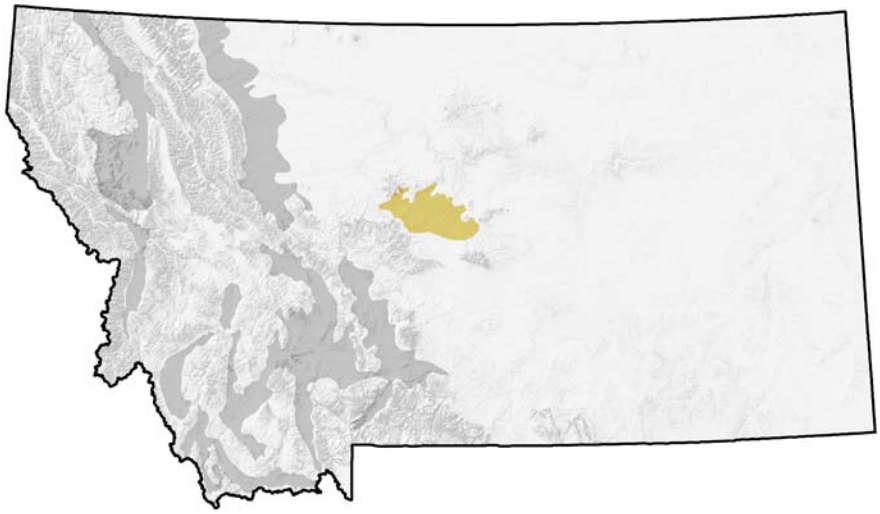

Figure 7. Little Belt Foothills Focus Area

The Little Belt Foothills area covers the Judith Basin, a large mountain foothill grassland community rimmed by the Little Belt, Highwood, Moccasin, and Big Snowy mountains. The Judith River, a tributary to the Missouri River, is the basin's primary drainage. Large, flat grassland benches define the high foothills. The lower elevations consist of rangeland interspersed with cropland, and sprawling terraces dominate the lower elevations. While about 30 percent of the landscape in the Judith Basin is farmed, the remaining areas support bunchgrass and sagebrush grasslands.

Landscape Characteristics

This subsection consists of foothills, terraces, and fans that formed in shale, siltstone, and terrace deposits. Elevations range from 3,500 to 5,000 feet. Drainage density is moderate. Mean annual precipitation ranges from 15 to 19 inches, with about 40 to 50 percent falling as snow. The soil temperature and moisture regimes are frigid and ustic. The primary natural disturbance is drought and fire. Other important natural biotic disturbances include beaver activity in riparian areas and prairie dog complexes in grassland areas. Land use is predominantly livestock grazing at higher elevations, with a combination of cropping and livestock grazing at lower elevations. The breakdown for land stewardship in the Little Belt Foothills area is as follows:

U.S. Federal Agencies:	16,309 acres, or 1.9% of total area, which include:
BLM:	15,197 acres, or 1.8% of total area
USFS:	1,112 acres, or 0.1% of total area
State Agencies:	77,159 acres, or 9.2% of total area
Private:	746,073 acres, or 88.9% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Mixed Mesic Shrubs	II	2.04
Very Low Cover Grasslands	I	2.36
Wetland and Riparian	I	7.34
Moderate/High Cover Grasslands	I	11.69
Agricultural Lands - Irrigated	III	18.99
Agricultural Lands - Dry	III	22.88
Low/Moderate Cover Grasslands	I	29.12

Note: A total of 94.42% of the Little Belt Foothills area is represented; 5.58% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 288 terrestrial vertebrate species that are found within the Little Belt Foothills Focus Area. Tier I species are listed below. All associations can be found in Table 13.

Amphibians: Northern Leopard Frog

Reptiles: Western Hog-nosed Snake and Milksnake

Birds: Bald Eagle, Greater Sage-Grouse, Mountain Plover, Long-billed Curlew, Black Tern, and Burrowing Owl

Mammals: Townsend's Big-eared Bat, Black-tailed Prairie Dog, and Black-footed Ferret

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles
Fragmentation and loss of native habitat as a result of conversion to cropland and human population growth/development	Government and private conservation programs/activities that encourage and support private land stewardship

	Encourage the conservation of natural rangeland communities through increased efforts to maintain ecological features (e.g., black-tailed prairie dog colonies) or processes (e.g., fire) on public lands
	Support state/federal tax incentives that discourage habitat fragmentation
	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
Altered natural fire regime	Work with public and private efforts to restore natural fire regime to area
Invasive or exotic plant species	Cooperative efforts to reduce the abundance of invasive or exotic species

References

The Nature Conservancy. 1999. Ecoregional Conservation in the Northern Great Plains Steppe. Northern Great Plains Steppe Ecoregional Planning Team. 76 pp.

North Tobacco Root Mountains and Foothills (224,989 acres)

Figure 8. North Tobacco Root Mountains and Foothills Focus Area

The rugged peaks of the Tobacco Root Mountains, with their abundant high mountain lakes and small running stream systems, overlook this area. These mountains have seen extensive historical mining activity that has resulted in numerous roads. The foothills provide important elk and mule deer winter range and are dominated by sagebrush/grassland that has seen conversion from the spraying and burning of sagebrush. Along the Jefferson River there are productive cottonwood riparian habitats that support an abundance of wildlife species including whitetailed deer and recently introduced Merriam's turkeys. The valley bottom is home to extensive agricultural production of cattle and alfalfa and little or no grain production.

Landscape Characteristics

This subsection consists of complex faulted mountains and foothills that formed in gneiss, volcanic, and a variety of sedimentary bedrock. Elevations range from 4,200 to 8,000 feet. Drainage density is high. Mean annual precipitation ranges from 10 to 25 inches, with about 35 percent falling as snow. The soil temperature and moisture regimes are frigid (cryic at higher elevations) and aridic ustic. The primary natural disturbance is fire. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly livestock grazing and timber harvest. The breakdown for land stewardship in the North Tobacco Root Mountains and Foothills area is as follows:

U.S. Federal Agencies:	32,309 acres, or 14.4% of total area, which include:
BLM:	17,544 acres, or 7.8% of total area
USFS:	14,765 acres, or 6.6% of total area
State Agencies:	20,695 acres, or 9.2% of total area

Private: 171,985 acres, or 76.4% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Wetland and Riparian	I	2.11
Agricultural Lands - Dry	III	3.29
Limber Pine	III	3.36
Agricultural Lands - Irrigated	III	3.83
Douglas Fir	II	5.01
Mixed Xeric Forest	III	7.42
Very Low Cover Grasslands	I	8.24
Sagebrush	I	11.88
Low/Moderate Cover Grasslands	I	50.44

Note: A total of 95.59% of the North Tobacco Root Mountains and Foothills area is represented; 4.41% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 244 terrestrial vertebrate species that are found within the North Tobacco Root Mountains and Foothills Focus Area. Tier I species are listed below. All associations can be found in Table 14.

Amphibians: Western Toad

Birds: Flammulated Owl and Bald Eagle

Mammals: Townsend's Big-eared Bat, Grizzly Bear, and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, degradation, and fragmentation, especially as a result of population growth/development	Support strategic conservation easements/protection by conservation organizations or public agencies by providing advice and technical assistance
	Promote and further develop county ordinances that help manage and plan for development
	Support state/federal tax incentives that discourage habitat fragmentation

	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
Invasive or exotic plant species	Participate in partnerships to develop and implement weed control strategies
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

References

The Nature Conservancy. 2000. Middle Rockies-Blue Mountains Ecoregional Conservation Plan. Prepared by the Middle Rockies-Blue Mountains Planning Team. 58 pp + appendices.

Rocky Mountain Front Foothills (2,018,789 acres)

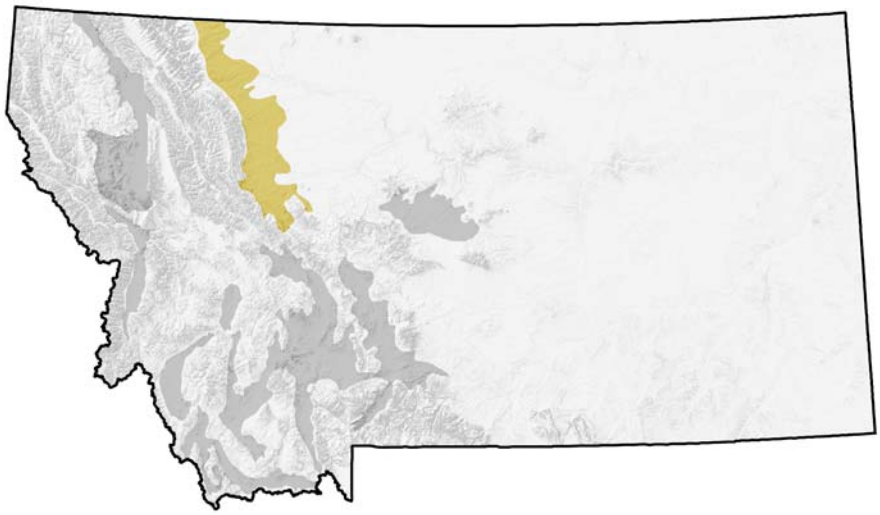

Figure 9. Rocky Mountain Front Foothills Focus Area

The Rocky Mountain Front, extending from Alberta, Canada, south through Montana, marks the easternmost edge of the Bob Marshall Wilderness, where thrust-faulted mountains give way to rolling foothills and Great Plains grasslands. This variable landscape still offers glimpses of grizzly bears moving from high mountain fir and spruce forests to native prairie grasslands dotted with pothole marshes where migrating birds stage season after season. With the exception of bison, all of the native mammals that inhabited this land when Lewis and Clark passed through survive here.

Landscape Characteristics

This subsection consists of mountain front foothills, moraines, fans, and terraces that formed in calcareous shales overlain by till, outwash, alluvium, and terrace deposits. The landscape has been modified by glaciation. Elevations range from 3,400 to 8,500 feet. Drainage density is low to moderate. Mean annual precipitation ranges from 12 to 20 inches, with about half falling as snow. The soil temperature and moisture regimes are frigid and typic ustic. Chinook winds are frequent. The primary natural disturbance is fire. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly livestock grazing. The breakdown for land stewardship in the Rocky Mountain Front Foothills area is as follows:

U.S. Federal Agencies:	33,421 acres, or 1.7% of total area, which include:
BLM:	9,019 acres, or 0.5% of total area
USFS:	4,819 acres, or 0.2% of total area
USFWS:	1,421 acres, or less than 0.1% of total area
State Agencies:	172,603 acres, or 8.5% of total area
Tribal Lands:	482,906 acres, or 23.9% of total area

Private: 1,329,427 acres, or 65.9% of total area

Associated Habitats

Habitat	Habitat Tier	Percent of Area
Limber Pine	III	2.02
Mixed Broadleaf Forest	I	2.13
Altered Herbaceous	II	3.77
Agricultural Lands - Dry	III	4.41
Agricultural Lands - Irrigated	III	5.96
Mixed Mesic Shrubs	II	6.13
Wetland and Riparian	I	6.47
Moderate/High Cover Grasslands	I	10.46
Low/Moderate Cover Grasslands	I	49.69

Note: A total of 91.03% of the Rocky Mountain Front Foothills area is represented; 8.97% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 362 terrestrial vertebrate species that are found within the Rocky Mountain Front Foothills Focus Area.Tier I species are listed below. All associations can be found in Table 15.

Amphibians: Western Toad and Northern Leopard Frog

Reptiles: Western Hog-nosed Snake

Birds: Common Loon, Trumpeter Swan, Harlequin Duck, Bald Eagle, Piping Plover, Mountain Plover, Long-billed Curlew, Black Tern, Flammulated Owl, and Burrowing Owl

Mammals: Townsend's Big-eared Bat, Black-tailed Prairie Dog, Northern Bog Lemming, Grizzly Bear, Canada Lynx, and American Bison

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat fragmentation as a result of conversion of natural lands to agriculture and human population growth/development and energy exploration and development activities	Policy-based approaches that encourage the conservation of natural communities rather than support their conversion

	Increased efforts to maintain ecological features (e.g., black-tailed prairie dog colonies) or processes (e.g., fire) on public lands as they disappear from private lands
	Promote further development of county ordinances that help guide future residential and commercial development
	Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity
Invasive or exotic plant species	Support cooperative efforts to eradicate or reduce the abundance of exotic or invasive plant species

References

The Nature Conservancy. 2005. Unpublished report.

The Nature Conservancy. 1999. Ecoregional Conservation in the Northern Great Plains Steppe. Northern Great Plains Steppe Ecoregional Planning Team. 76 pp.

U.S. Fish and Wildlife Service. 2004. Conservation Focus Areas of the Great Divide: a vast region encompassing the Upper Missouri, Yellowstone and upper Columbia watersheds. Publisher: USFWS, Benton Lake Wildlife Refuge, Great Falls, MT. 77 pp.

South Elkhorn Mountains (171,059 acres)

Figure 10. South Elkhorn Mountains Focus Area

The South Elkhorn Mountains area is a diverse landscape with vegetation and topography more typical of central Montana than the intermountain western portion of Montana. Sagebrush grasslands and broken and rough terrain are found throughout much of this area, although much of the southern portion has been converted to dryland grain and CRP grasslands. Mule deer and antelope are common throughout much of the South Elkhorn Mountains area, and greater sage-grouse were rumored to have been common prior to the loss of much of their primary sagebrush habitat. In the northern portion of this area, as the mountainous portion of the Elkhorn Mountains is approached, the common geologic formations are limestone ridges and outcrops. These ridges provide the environment for abundant stands of mountain mahogany, which among other things makes this area very attractive as mule deer winter range.

Landscape Characteristics

This subsection consists of mountains and foothills that formed in limestone, dolomite, argillite, andesite, sandstone, and quartzite. Elevations range from 4,500 to 7,500 feet. Drainage density is low. Mean annual precipitation ranges from 12 to 22 inches, with about 30 percent falling as snow. The soil temperature and moisture regimes are frigid (cryic at higher elevations) and aridic ustic. The primary natural disturbance is fire. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly livestock grazing and timber harvest. The breakdown for land stewardship in the South Elkhorn Mountains area is as follows:

U.S. Federal Agencies:	71,105 acres, or 41.6% of total area, which include:
BLM:	8,494 acres, or 5% of total area

USFS:	22,610 acres, or 13.2% of total area
State Agencies:	6,425 acres, or 3.7% of total area
Private:	93,529 acres, or 54.7% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Lodgepole Pine	III	2.12
Montane Parkland and Subalpine Meadows	III	3.42
Rocky Mountain Juniper	III	7.41
Mixed Xeric Forest	III	7.54
Douglas Fir	II	8.17
Very Low Cover Grasslands	I	13.66
Sagebrush	I	22.13
Low/Moderate Cover Grasslands	I	28.70

Note: A total of 93.14% of the South Elkhorn Mountains area is represented; 6.86% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 243 terrestrial vertebrate species that are found within the South Elkhorn Mountains Focus Area. Tier I species are listed below. All associations can be found in Table 16.

Amphibians: Western Toad and Northern Leopard Frog

Birds: Bald Eagle and Black-backed Woodpecker

Mammals: Townsend's Big-eared Bat, Pallid Bat, Gray Wolf, and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, degradation, and fragmentation, especially as a result of human population growth	Support strategic conservation easements/protection by conservation organizations or public agencies by providing advice and technical assistance
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote and further develop county ordinances that help plan for and manage development
	Support state/federal tax incentives that discourage habitat fragmentation

Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles
Invasive or exotic plant species	Participate in partnerships to develop and implement weed control strategies

References

The Nature Conservancy. 2000. Middle Rockies-Blue Mountains Ecoregional Conservation Plan. Prepared by the Middle Rockies-Blue Mountains Planning Team. 58 pp + appendices.

Southwest Montana Intermontane Basins and Valleys (2,077,477 acres)

Figure 11. Southwest Montana Intermontane Basins and Valleys Focus Area

The area consists of valleys that are located between mountain ranges and typically follow major stream courses. Many small tributary mountain streams flow down the hillsides of these valleys and support wetlands, rivers such as the Red Rock, Madison, Jefferson, and Big Hole, and Red Rock Lakes. The vegetation is a mix of sagebrush grassland on the valley floor, and in the wet valley bottoms, riparian species like sedges and willows are common. Coniferous forest and aspen stands in the wetter microsites dominate the higher elevations. The coniferous forest and adjacent sagebrush communities provide winter habitats for mule deer and elk, while the riparian bottoms provide yearlong habitat for white-tailed deer. These intermountain basins and valleys are highly valued for residential development and are under the imminent threat of habitat fragmentation.

Landscape Characteristics

This subsection consists of intermontane basins and broad valleys that formed in alluvium, glacial deposits, and Tertiary volcanic materials. Elevations range from 4,700 to 7,600 feet. Drainage density is low. Mean annual precipitation ranges from 9 to 20 inches, with about 10 percent falling as snow. The soil temperature and moisture regimes are frigid and aridic ustic. Parts of the Red Rock Basin and Big Hole Valley have cryic temperature regimes. The primary natural disturbances are flooding and fire. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly livestock grazing, agriculture, and urban/suburban development. The breakdown for land stewardship in the Southwest Montana Intermontane Basins and Valleys area is as follows:

U.S. Federal Agencies:	479,632 acres, or 23.1% of total area, which include:
BLM:	344,156 acres, or 16.6% of total area
USFS:	96,180 acres, or 4.6% of total area
USFWS:	38,610 acres, or 1.9% of total area
NPS:	680 acres, or less than 0.1% of total area
State Agencies:	275,028 acres, or 13.2% of total area
Private:	1,318,307 acres, or 63.5% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Very Low Cover Grasslands	I	5.19
Wetland and Riparian	I	6.94
Agricultural Lands - Irrigated	III	9.04
Sagebrush	I	30.19
Low/Moderate Cover Grasslands	I	31.81

Note: A total of 83.17% of the Southwest Montana Intermontane Basins and Valleys area is represented; 16.83% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 296 terrestrial vertebrate species that are found within the Southwest Montana Intermontane Basins and Valleys Focus Area. Tier I species are listed below. All associations can be found in Table 17.

Amphibians: Western Toad

Birds: Common Loon, Trumpeter Swan, Bald Eagle, Greater Sage-Grouse, Long-billed Curlew, and Flammulated Owl

Mammals: Townsend's Big-eared Bat, Pygmy Rabbit, Great Basin Pocket Mouse, Gray Wolf, Grizzly Bear, and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat fragmentation and loss of connectivity as a result of human population growth/development	Identify and prioritize key wildlife linkage areas and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity

	Support strategic conservation easements/protection by conservation organizations or public agencies by providing advice and technical assistance
	Support state/federal tax incentives that discourage habitat fragmentation
	Participate in government and private conservation programs/activities that encourage and support private land stewardship
	Promote and further develop county ordinances that help plan for and manage development
	Support habitat-protecting conservation incentives directed at private landowners
	Manage for the sustainable use of recreational vehicles on public lands
Invasive or exotic plant species	Participate in partnerships to develop and implement weed control strategies, especially strategies that promote plant diversity
Altered fire regime	Work with public and private efforts to restore natural fire regimes to area
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

References

Fargione, Joseph, Cynthia S. Brown, and David Tilman. 2003. Community assembly and invasion: an experimental test of neutral versus niche processes. PNAS. Vol. 100 (15):8916–8920.

Montana Partners for Fish & Wildlife. 2000. Centennial Valley. 4 pp. More information at http://www.r6.fws/gpv/pfw/montana/mt3c.htm.

The Nature Conservancy. 2005. Unpublished report.

The Nature Conservancy. 2000. Middle Rockies-Blue Mountains Ecoregional Conservation Plan. Prepared by the Middle Rockies-Blue Mountains Planning Team. 58 pp + appendices.

U.S. Fish and Wildlife Service. 2004. Conservation Focus Areas of the Great Divide: a vast region encompassing the Upper Missouri, Yellowstone and upper Columbia watersheds. Publisher: USFWS, Benton Lake Wildlife Refuge, Great Falls, MT. 77 pp.

Upper Yellowstone Valley (178,039 acres)

Figure 12. Upper Yellowstone Valley Focus Area

The Upper Yellowstone Valley area, south of Livingston, is better known to many as Paradise Valley. Bracketed by the Absaroka-Beartooth Wilderness on the east and the Gallatin Range on the west, the valley's grassland habitats are bisected by the Yellowstone River and its riparian areas and cottonwood stands. Several streams in the area harbor genetically pure populations of Yellowstone cutthroat trout. Much of the valley lies in the rain shadow of the mountains and is a wintering area for elk, bighorn sheep, and mule deer. The area supports grizzly bears, and there is an increasing wolf presence. Cradled within the Gallatin and Absaroka ranges are low-elevation meadows and limited juniper stands mixed with grasslands and sagebrush. Higher up are forests of aspen, pine, spruce, subalpine fir, and whitebark pine.

Landscape Characteristics

This valley consists of valley floor, terraces, toeslopes, and foothills that formed in alluvium and Tertiary sedimentary and volcanic rocks. Elevations range from 4,500 to 7,500 feet. Drainage density is moderate and wetlands are fairly common. Mean annual precipitation ranges from 15 to 40 inches, with about 55 percent falling as snow. The soil temperature and moisture regimes are frigid and aridic ustic. The primary natural disturbance is flooding. Another important natural biotic disturbance is beaver activity in riparian areas. Land use is predominantly recreational development, with some agriculture and livestock grazing. The breakdown for land stewardship in the Upper Yellowstone Valley area is as follows:

U.S. Federal Agencies:	18,656 acres, or 10.5% of total area, which include:
BLM:	1,668 acres, or 0.9% of total area

USFS:	16,988 acres, or 9.6% of total area
State Agencies:	12,293 acres, or 7% of total area
Private:	146,101 acres, or 82.1% of total area

Associated Habitats

Habitat	Habitat Tier	Percentage of Area
Mixed Broadleaf Forest	I	2.14
Mixed Xeric Forest	II	2.28
Moderate/High Cover Grasslands	I	2.28
Mixed Subalpine Forest	III	3.95
Agricultural Lands - Dry	III	3.98
Wetland and Riparian	I	4.57
Montane Parkland and Subalpine Meadows	III	5.00
Douglas Fir	II	5.17
Sagebrush	I	5.49
Agricultural Lands - Irrigated	III	7.15
Rock	III	7.87
Very Low Cover Grasslands	I	11.16
Low/Moderate Cover Grasslands	I	28.56

Note: A total of 89.61% of the Upper Yellowstone Valley area is represented; 10.39% is made up of a combination of other habitat types.

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 264 terrestrial vertebrate species that are found within the Upper Yellowstone Valley Focus Area. Tier I species are listed below. All associations can be found in Table 18.

Amphibians: Western Toad and Northern Leopard Frog

Birds: Trumpeter Swan, Bald Eagle, Long-billed Curlew, and Black-backed Woodpecker

Mammals: Gray Wolf, Grizzly Bear, and Canada Lynx

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Recreational infrastructure development, especially road network development	Work with Montana Department of Transportation and Federal Highway Commission to effectively mitigate impacts of highway construction

Habitat loss and fragmentation, especially as a result of human population growth/development	Support strategic conservation easements/protection by conservation organizations or public agencies
	Support state/federal tax incentives that discourage habitat fragmentation
	Promote and further develop county ordinances that help plan for and manage development
	Support state/federal tax incentives that discourage habitat fragmentation
Invasive or exotic plant species	Support efforts to eradicate exotic or invasive plant species
Range or forest management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)
Streamside residential development	Develop statewide riparian best management principles

References

A Biological Conservation Assessment for the Utah-Wyoming Rocky Mountain Ecoregion: Report to The Nature Conservancy. 2001. R. Noss, G. Wuerthner, K. Vance-Borland, and C. Carroll. Conservation Science, Inc. 125 pp + Executive Summary and Appendix D.

Aquatic Conservation Focus Areas in Greatest Need (Tier I)

Big Hole River (153 River Miles)

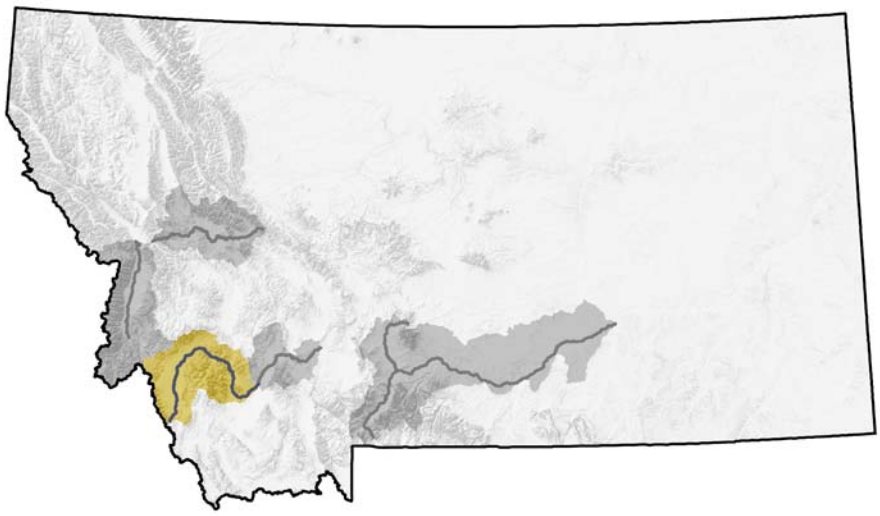

Figure 13. Big Hole River Focus Area

Originally named the Wisdom River by Meriwether Lewis, the Big Hole River and its tributaries start along the border of Montana and Idaho. Surrounded by hay meadows, the upper Big Hole separates the Bitterroot Range on the west from the Pioneer Mountains to the east. The middle section of the river runs through a length of gorge and then glides out through hay meadows once again, where it teams up with the Beaverhead River to create the Jefferson River.

Associated Habitats

Habitat Type	Habitat Tier	Acres	Miles
Intermountain Valley Rivers	II		153
Intermountain Valley Streams	II		967
Lowland Lakes	III	297	
Lowland Reservoirs	III	64	
Mountain Lakes	III	2,886	
Mountain Reservoirs	III	12	
Mountain Streams	II		2,929

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 19 aquatic species that are found within the Big Hole River Focus Area. Tier I species are listed below. All associations can be found in Table 19.

Invertebrates: Western Pearlshell

Fish: Westslope Cutthroat Trout, Lake Trout (native lakes), Arctic Grayling, and Burbot

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Diversion of water for irrigation ditches and livestock watering	Increased installation of stockwater wells in place of irrigation ditches
Entrainment of juvenile and adult fishes by irrigation diversion or other water intakes	Screening or modification of irrigation diversions or other water intakes in a manner that prevents entrainment of fishes
Riparian vegetation effected by range and forest management practices and streamside residential development (such activities destabilize streambanks, increase sediment inputs, reduced shading, and remove woody debris)	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
	Develop statewide riparian best management principles
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores fish passage
Modification and degradation of stream channels caused by various construction or land management practices	Restoration of stream channels, streambanks and riparian areas to a condition that simulates their natural form and function
Alterations of the quantity or timing of stream flows, causing dewatering or unnatural flow fluctuations that diminish the quantity or quality of essential habitats	Implementation of various water conservation or flow management practices that restore essential habitats, simulate the natural hydrograph and also protect instream flow
Invasive or exotic plant species	Participate in partnerships to develop and implement weed control strategies as well as invasive species management

References

Montana Partners for Fish & Wildlife. 2000. Big Hole River Watershed. 4 pp. More information at http://www.r6.fws/gpv/pfw/montana/mt3c.htm.

Bitterroot River (84 River Miles)

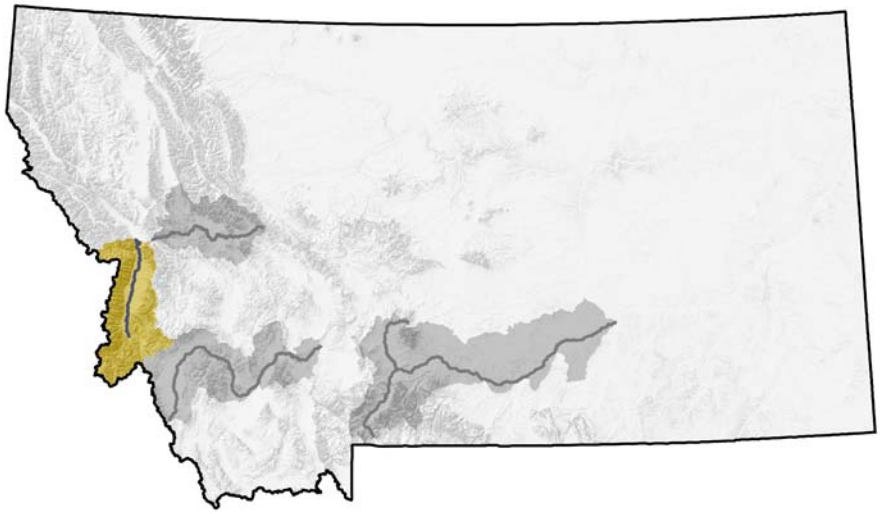

Figure 14. Bitterroot River Focus Area

The Bitterroot River originates in the Anaconda-Pintler Wilderness and the Bitterroot Mountains in Montana. As the primary tributaries flow together near Conner, Montana, it continues north along U.S. Highway 93 for 85 miles to where it empties into the Clark Fork River near Missoula. To the west is the glacial Bitterroot Range, and to the east rises the smoother and drier Sapphire Mountains. Just west of the Bitterroot Range lies the Selway-Bitterroot Wilderness, which encompasses more than 2.15 million acres. The river is characterized by constantly shifting stream channels among extensive cottonwood and ponderosa pine bottomland.

Associated Habitats

Habitat Type	Habitat Tier	Acres	Miles
Intermountain Valley Rivers	II		84
Intermountain Valley Streams	II		325
Lowland Lakes	III	1,260	
Mountain Lakes	III	2,946	
Mountain Reservoirs	III	27	
Mountain Streams	II		3,304

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 21 aquatic species that are found within the Bitterroot River Focus Area. Tier I species are listed below. All associations can be found in Table 20.

Invertebrates: Western Pearlshell

Fish: Westslope Cutthroat Trout and Bull Trout

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Valley fragmentation as a result of human population growth	Pursue conservation easements within the valley
Presence of non-native aquatic species including warmwater fishes, bullfrogs, crayfish, and milfoil	Programs to control exotic species and promote natural habitats that support native species but not exotic species
Water quality problems due to municipal discharge, irrigation return water, and other sources	Work with municipal government and private landowners to reduce point source pollutants
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores beneficial fish passage
Entrainment of juvenile and adult fishes by irrigation diversions or other water intakes	Screening or modification of irrigation diversions or other water intakes in a manner that prevents entrainment of fishes
Modification and degradation of stream channels caused by various construction or land management practices	Restoration of stream channels or streambanks to a condition that simulates their natural form and function
Riparian vegetation effected by range and forest management practices and streamside residential development (such activities destabilize streambanks, increase sediment inputs, reduced shading, and remove woody debris)	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
	Modification of riparian management practices such that riparian vegetation is allowed to recover
	Develop statewide riparian best management principles

Alterations of the quantity or timing of stream flows, causing dewatering or unnatural flow fluctuations that diminish the quantity or quality of essential habitats	Implementation of various water conservation or flow management practices that restore essential habitats, simulate the natural hydrograph and also protect instream flows

Blackfoot River (127 River Miles)

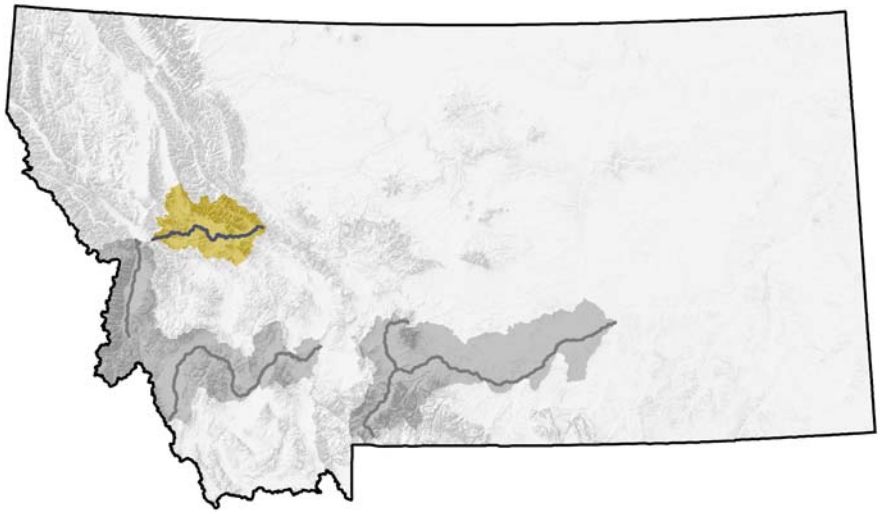

Figure 15. Blackfoot River Focus Area

The Blackfoot River begins at the junction of Beartrap and Anaconda creeks near the Continental Divide and flows west 132 miles to its mouth at Bonner, Montana. Near its headwaters, the Blackfoot River drops through glaciated high-alpine meadows and runs between steep, forested slopes. Above Lincoln, the river almost annually goes underground, then reappears below Lincoln and meanders through conifer forests and wetlands until it intersects with the North Fork of the Blackfoot River. For its remaining 52 miles, the Blackfoot levels out and moves through open ranch and timbered areas until it meets the Clark Fork River near Bonner. A free-flowing river, the Blackfoot is affected by the soon-to-be-removed Milltown Dam, which has blocked fish passage on the Clark Fork River since 1907.

Associated Habitats

Habitat Type	Habitat Tier	Acres	Miles
Intermountain Valley Rivers	II		127
Intermountain Valley Streams	II		316
Lowland Lakes	III	6,525	
Lowland Reservoirs	III	390	
Mountain Lakes	III	2,604	
Mountain Reservoirs	III	5	
Mountain Streams	II		3,207

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 23 aquatic species that are found within the Blackfoot River Focus Area. Tier I species are listed below. All associations can be found in Table 21.

Invertebrates: Western Pearlshell

Fish: Westslope Cutthroat Trout and Bull Trout

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores fish passage for fluvial native fish, including the Milltown Dam
Modification and degradation of stream channels caused by various construction or land management practices	Restoration of stream channels or streambanks to a condition that simulates their natural form and function
Riparian vegetation effected by range and forest management practices and streamside residential development (such activities destabilize streambanks, increase sediment inputs, reduced shading, and remove woody debris)	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
	Modification of riparian management practices such that riparian vegetation is allowed to recover
	Develop statewide riparian best management principles
Entrainment of juvenile and adult fishes by irrigation diversions or other water intakes	Screening or modification of irrigation diversions or other water intakes in a manner that prevents entrainment of fishes

Unnatural hydrograph and water temperatures associated with the presence and operations of large dams, as well as blockage of migratory corridors (These alterations of the quantity or timing of stream flows cause unnatural flow fluctuations that diminish the quantity or quality of essential habitats	Implementation of various water conservation or flow management practices that restore essential habitats, simulate the natural hydrograph and also protect instream flows
Water chemistry problems that arise due to hard rock mines in headwaters	Implementation of a comprehensive mine cleanup in the headwaters of the Blackfoot River upstream of Lincoln, Montana

Jefferson River (77 River Miles)

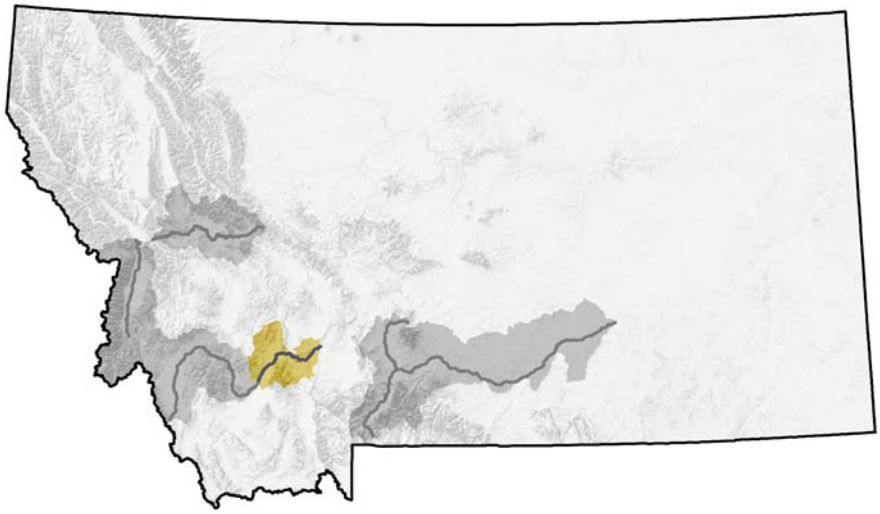

Figure 16. Jefferson River Focus Area

Lewis and Clark named this river after President Thomas Jefferson because it carried the greatest volume of water at that time compared to the nearby Madison and Gallatin rivers. The Jefferson River begins where the Big Hole and Beaverhead rivers intersect and flows north through agricultural areas and limestone cliffs, and into the cottonwood bottoms near Three Forks, where it meets the Madison and Gallatin rivers to form the Missouri River.

Associated Habitats

Habitat Type	Habitat Tier	Acres	Miles
Intermountain Valley Rivers	II		77
Intermountain Valley Streams	II		1,377
Lowland Lakes	III	214	
Lowland Reservoirs	III	715	
Mountain Lakes	III	627	
Mountain Reservoirs	III	609	
Mountain Streams	II		1,091

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 20 aquatic species that are found within the Jefferson River Focus Area. Tier I species are listed below. All associations can be found in Table 22.

Invertebrates: Western Pearshell

Fish: Westslope Cutthroat Trout and Burbot

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce habitat connectivity	Removal or modification of barriers in a manner that restores fish passage
Modification and degradation of stream channels caused by various construction or land management practices	Restoration of stream channels or streambanks to a condition that simulates their natural form and function
Riparian vegetation effected by range and forest management practices and streamside residential development (such activities destabilize streambanks, increase sediment inputs, reduced shading, and remove woody debris)	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
	Modification of riparian management practices such that riparian vegetation is allowed to recover
	Develop statewide riparian best management principles
Entrainment of juvenile and adult fishes by irrigation diversions or other water intakes	Screening or modification of irrigation diversions or other water intakes in a manner that prevents entrainment of fishes
Alterations of the quantity or timing of stream flows causing dewatering, temperature change or unnatural flow fluctuations that diminish the quantity or quality of essential habitats	Implementation of various water conservation or flow management practices that restore essential habitats, help sustain lower temperatures, and simulate the natural hydrograph as well as protect instream flows

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Upper Yellowstone River (272 River Miles)

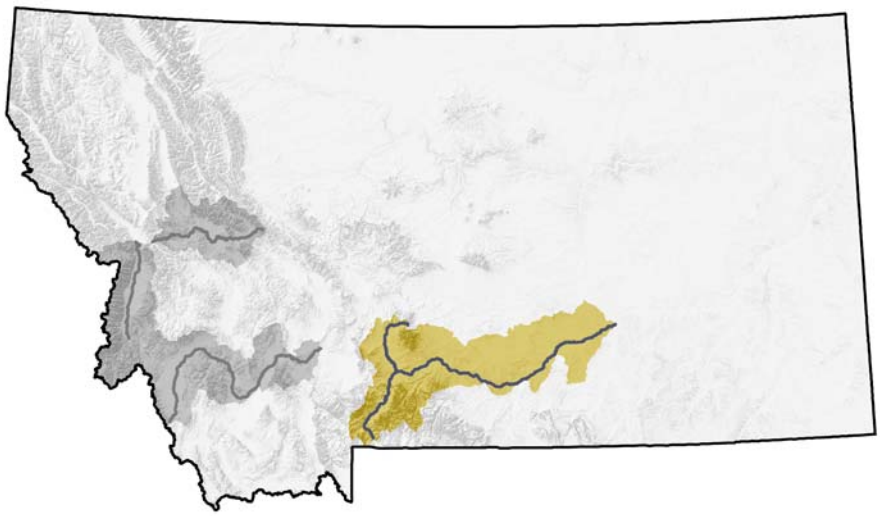

Figure 17. Upper Yellowstone River Focus Area

The Yellowstone River originates in Wyoming and flows through Yellowstone National Park before entering Montana near Gardiner. From the park boundary to Livingston, the river flows north through the Gardiner Basin and eventually enters the Paradise Valley, flanked by the Absarokee Mountains on the east and the Gallatin Range on the west. The river continues in a northeasterly direction from Livingston and meets up with the Missouri River just across the North Dakota border. The Yellowstone has survived as one of the last, large, free-flowing rivers in the continental United States. Lack of impoundments allows spring peak flows and fall and winter low flows that support a naturally unique and dynamic community. The Upper Yellowstone River supports clear, coldwater cutthroat trout fisheries in Yellowstone National Park to the warmwater habitats on the plains. The adjacent environments include cottonwood-willow bottomlands and broad low cover grasslands.

Associated Habitats

Habitat Type	Habitat Tier	Acres	Miles
Lowland Lakes	III	10,838	
Lowland Reservoirs	III	580	
Mixed Source Rivers (Intermountain and Prairie Flow)	II		259
Prairie Streams	I		5,378
Intermountain Valley Rivers	II		131
Intermountain Valley Streams	II		1,068
Mountain Lakes	III	1,893	

Mountain Streams	I	2,834

Associated Species of Greatest Conservation Need (Tier I Species)

There are a total of 46 aquatic species that are found within the Upper Yellowstone River Focus Area. Tier I species are listed below. All associations can be found in Table 23.

Fish: Yellowstone Cutthroat Trout, Burbot, and Sauger

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Dewatering as a result of water diversion	Work with public and private land owners to improve efficiency of water use in order to maximize water return
Water chemistry problems due to irrigation return water and the discharge of wastewater from coal bed methane operations, and other sources	Support cooperative efforts to minimize impacts of return water due to sedimentation, increased salinity and temperature alteration
Riprap and other streambank stabilization work	Work with new stabilization projects to reduce impacts and support efforts to restore existing rip-rap areas to natural condition
	Develop statewide riparian best management principles
Invasive non-native fish species	Programs to control exotic species and promote natural habitats that support native species but not exotic species
Entrainment of juvenile and adult fishes by irrigation diversions or other water intakes	Screening or modification of irrigation diversions or other water intakes in a manner that prevents entrainment of fishes
Riparian vegetation effected by range and forest management practices and streamside residential development (such activities destabilize streambanks, increase sediment inputs, reduced shading, and remove woody debris)	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
Modification and degradation of stream channels caused by various construction or land management practices	Restoration of stream channels or streambanks to a condition that simulates their natural form and function

	Modification of riparian management practices such that riparian vegetation is allowed to recover
	Develop statewide riparian best management principles
Alterations of the quantity or timing of stream flows, causing dewatering or unnatural flow fluctuations that diminish the quantity or quality of essential habitats	Implementation of various water conservation or flow management practices that restore essential habitats, simulate the natural hydrograph and also protect instream flows
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores fish passage

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